

Claims

1. A process for the production of a thin nitrogenous layer on a semiconductor surface, characterised by the process steps:
 - contacting at least a part of the surface with a nitrogenous liquid,
 - applying an electrical voltage between the surface, the liquid and an electrode according to a given voltage-time curve until a layer thickness of less than 5 nm is formed, and
 - separating the surface from the liquid.
2. A process for the production of a thin nitrogenous layer on a metal surface or on a metal layer located on a substrate, characterised by the process steps;
 - contacting at least a part of the surface or the metal layer with a nitrogenous liquid,
 - applying an electrical voltage between the surface or metal layer, the liquid and an electrode according to a given voltage-time curve until a layer thickness of less than 50 nm is formed, and
 - separating the surface or the metal layer from the liquid.
3. A process for detaching an oxygen-containing and/or nitrogenous layer on a semiconductor or metal surface, characterised by the process steps;
 - contacting at least a part of the surface with a water-free nitrogenous liquid which comprises a fluorine-containing substance, and
 - separating the surface from the liquid.

4. A process in accordance with Claim 3, characterised by the application of an electrical voltage between the surface, the liquid and an electrode according to a given voltage-time curve.
5. A process in accordance with any of the preceding Claims, characterised in that the nitrogenous liquid consists of nitrogen and hydrogen.
6. A process in accordance with any of the preceding Claims, characterised in that the nitrogenous liquid comprises NH_3 , N_2H_4 , $\text{N}_2\text{H}_4 \cdot x\text{H}_2\text{O}$ or a mixture of these compounds.
7. A process in accordance with any of the preceding Claims 1 to 5, characterised in that the nitrogenous liquid is free from dissolved or molecularly bound oxygen and/or free from water.
8. A process in accordance with any of the Claims 1 to 7, characterised in that the surface is part of a semiconductor substrate which essentially comprises silicon and is preferably a silicon wafer.
9. A process in accordance with any of the preceding Claims 1 to 8, characterised in that, apart from nitrogen, the nitrogenous liquid only contains the elements nitrogen, hydrogen, oxygen, fluorine or carbon or combinations and/or compounds of these elements or their isotopes.
10. A process in accordance with any of the preceding Claims, characterised in that the surface comprises structures.
11. A process in accordance with any of the preceding Claims, characterised in that any oxygen-containing and/or

nitrogenous compounds are completely or at least partially removed from the surface prior to the contacting of the surface with the nitrogenous liquid.

12. A process in accordance with Claim 11, characterised in that the oxygen-containing compound comprises SiO_x or SiO_2 .
13. A process in accordance with any of the preceding Claims 1, 2, 4 to 12, characterised in that the electrical voltage comprises a DC voltage component or a time-voltage profile of between 0 V and 20 V, and in that the metal or semiconductor surface forms an anode with respect to at least one electrode.
14. A process in accordance with any of the preceding Claims, characterised in that the surface is subjected to at least a lithographic and/or a thermal and/or a plasma-chemical treatment step after the separation step.
15. A process in accordance with any of the preceding Claims 1, 2, 4 to 14, characterised in that the electrical voltage between the surface and at least one electrode is an alternating voltage or comprises an alternating voltage component.
16. A process in accordance with any of the preceding Claims, characterised in that any oxygen-containing layer is detached from the surface in situ by the nitrogenous liquid.
17. A process in accordance with Claim 16, characterised in that the nitrogenous liquid comprises HF and/or NH_4F or other or additional chemicals which assist the detachment of the oxygen-containing layer.

18. A semiconductor substrate treated in accordance with at least one of the Claims 1 to 17.